

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

MAY, 31, 1954

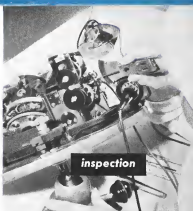
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assembly line methods



operating room cleanliness



inspection

It takes two kinds of care to make a gyro right

THE care it takes to make a better gyro comes in two varieties.

One is the visible kind. You see plenty of that in the photos of the Honeywell gyro operation shown here. It's hard to over-stress its importance when the quality of such a delicate mechanism is at stake.

Another is the kind you *can't* see.

This includes such things as rigid control of temperature, humidity and purity of air in all our gyro rooms. It most certainly includes the unexcelled training of our engineers and production workers. The thoroughness of our design, development and production methods is also of significant importance.

Both kinds of care have helped Honeywell become the nation's leading producer of precision gyros. The complete Honeywell gyro line includes the Cage-

able Vertical Gyro, and many other Vertical and Rate Gyros—including the Hermetic Integrating Gyro, the world's most sensitive.

The Honeywell gyro line is but a part of our complete line of airborne controls. This line is continually expanding, as we make new discoveries and learn of new needs. Automatic control is important to aviation's progress, and automatic control is Honeywell's business.

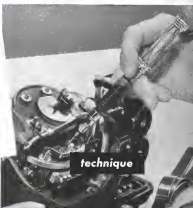
MINNEAPOLIS
Honeywell
Aeronautical Division



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testing



technique

What's so **DIFFERENT**

about **HY- $\frac{V}{4}$** * Fuel Booster Pumps?

It's not the pump—it's the principle!

Other fuel booster pumps attempt to separate the vapor from boiling fuel. The HY- $\frac{V}{4}$ principle, developed by Hydro-Aire, is to take both vapor and liquid together and condense the vapor back into the liquid inside the pump.

In other words, the HY- $\frac{V}{4}$ Pump is more efficient. It saves the extra power needed to drive a separator.

That is why, in tests sea-level to 70,000 feet, the HY- $\frac{V}{4}$ pumps were fuel at more pressure with less power consumption. HY- $\frac{V}{4}$ Pumps have been tested at rates of climb far in excess of aircraft performance for years to come. In addition, HY- $\frac{V}{4}$ Pumps have the power of immediate recovery both after temporary power failure and after being completely uncovered at the inlet.



100% Capacity A-10 Hydro-Aire Fuel Booster Pump
Delivers 40-500 G.P.M. per hour at 20 psi
maximum pressure.



HYDRO-AIRE
New Fuel Booster Pumps, Turbine, Gear,
Reciprocating, etc.



Subcompact 5-7" Turbine Motor (1000-1500 RPM) Boosts Fuel Pressure 20-500 G.P.M. per hour at 20 psi maximum pressure.

Subcompact 4" Turbine Motor (1000-1500 RPM) Boosts Fuel Pressure 20-500 G.P.M. per hour at 20 psi maximum pressure.

4" Gear Motor (1000-1500 RPM)

Reciprocating 4" Turbine Motor (1000-1500 RPM) Boosts Fuel Pressure 20-500 G.P.M. per hour at 20 psi maximum pressure.

EVERY FIGHTER, EVERY BOMBER, EVERY TRANSPORT IS HYDRO-AIRE EQUIPPED

BRANDS KEYS

B.F. Goodrich

FIRST IN RUBBER



"Two-way stretch" adds life to B. F. Goodrich shoe

STRAIGHT elastic wires in propeller shoes do a good job of supplying the extra needed to absorb use. Yet they have enough "give" when installing the shoe around a curved propeller blade and not enough ruggedness to take the shock of normal vibration. In other words, stresses may cause the wires to weaken and break, and the shoes have to be replaced.

B. F. Goodrich engineers set out to design a pump shoe for the Air Force's C-119 Hustler that would solve these problems. First, they adopted the idea of using stranded wires—continuous coils that add strength without adding weight. Then, they crimped the wires

into a "zig-zag" shape. This gives the shoe a built-in flexibility, less it stretch too much to prevent wire breakage.

B. F. Goodrich also designed a superior bonded rubber for the propeller sole, using the same zig-zag wire arrangement. The new B. F. Goodrich shoe may absorb propeller shock and still wear as service as the C-119, giving longer service life and dependable air service.

A typical development of B. F. Goodrich engineering and research for aviation, shockingly bonded rubber is also used in wings, hydraulic lines, wheel rails, spring doors, jet engine casings and many other replace parts. B. F. Goodrich bonded rubber has

other advantages. It can supply heat energy in cycles to insure air so that air stream can carry it away more consistently, to keep air from forming. BFG bonded rubber can be opened from the place it rigidly joins, supply is completely design, wires weight, can be contacted on.

Other BFG aviation products: tires, wheels and brakes, De Luxe, Avionic, inflatable seats, fuel cells, Pressure Sealing, Zippers, Rivets, hose and other accessories. The B. F. Goodrich Company, Akron, Ohio.

B.F. Goodrich
FIRST IN RUBBER

Elastic properties of AIRCORD at your fingertips!



THIS NEW ROEBLING SOCIETY is the only practical and economic material ever offered engineers and engineers on the physical characteristics of engine control cable.

The first half of the booklet deals with the elastic properties of Roebbling Aircraft. It shows why the usual AE values of materials used and why rope are not applicable to successful service... gives elastic moduli values... compares the elongation curves of steel and of Roebbling Lock-Cord Aircraft, and graphically compares the special design and service features of Lock-Cord.

The last half of the booklet deals with the physical properties of aircraft cable and... The engineer before will find your free copy by return mail. John A. Roebbling & Sons Corporation, Elizabeth 2, N. J. A booklet of The Science and Art of Cable.

John A. Roebbling & Sons Corp., Elizabeth 2, New Jersey
Engineers: Study and use as a guide of booklet, "Elastic and Tensile Properties of Roebbling Aircraft."

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Aviation Week

MAY 31, 1954

Vol. 40, No. 22

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SAVES WEIGHT, SPACE, MONEY...

New Two-In-One Air Flow Valve!

For the first time, AirResearch combines air flow control and shut-off valves in a single lightweight, highly efficient unit!

Seeking constantly to simplify the vital components of modern aircraft, AirResearch has now combined two functions into one device... at lower cost!

The new combination air flow control and shut-off valve weighs 1.3 lbs., less than the two units it replaces. It takes up less vital space. Made of steel instead of aluminum, it can withstand pressure up to 230 psi instead of 83 psi and temperatures up to 300°F instead of 300°F.

Experience of AirResearch engineers in producing over 150,000 air valves,

ensuring more than 500,000 hours of development tests, is reflected in this newest achievement.

For best, as in all AirResearch production, the goal is ever greater performance from smaller size and weight at lower cost. If you have a problem in any of the fields listed below, consult our engineering assistance team.

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HEAT EXCHANGERS

FUEL PUMPS

ELECTROMECHANICAL CONTROLS

MAIN PRESSURE CONTROLS



the man from Esso... the field service representative

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of all the world's international airlines... 8 out of 10 use



AVIATION PRODUCTS



Domestic

President Eisenhower last week accepted the Aviation Policy Report of the Air Conditioning Committee (Aircraft News May 5, p. 12) with the comment that he will "use it as a guide to future policy" on aeronautical problems confronting his Administration.

Cessna F-102 is scheduled to begin a flight test program about June 15 at the Fairchild, Calif., test center for production jet aircraft. Approximately 100 Cessna personnel will be at the center for the trials. F-102 flight tests also will continue at Edwards AFB.

Navy Viking rocket test work set a new altitude record of 151 mi. at White Sands, N. M., topping the previous mark by 22 mi. The Marine-built, single-stage missile hit 4,500 mph during the test, 100 mph faster than a Viking fired May 7 (Aviation Week May 17, p. 7).

First production T1F-5, latest version of Grumman Aircraft Engineering Corp.'s Cougar jet fighter series (Aviation Week May 5, p. 5), test work was delivered to the Navy at the builder's Beltsville, Md., plant.

World endurance record for aircraft and crew was set last week by a Navy F4D-1 Corsair, which it left Lakeland, N. J., with 15 persons aboard. After being airborne for 280 hr, the light-twinship ship landed at NAS Beaufort, Fla. The test was held to study new endurance problems on long-range, anti-sub patrol.

Reg. Gen. Milton W. Arnold (USAF Ret.), vice president-operations of Air Transport America, has withdrawn his \$1 million abandoned aircraft suit against General Motors, president of General Motors Corp. (Aviation Week May 12, p. 7). The general will litigate in a Federal court in the country of his adopted state, Charles E. Fink, Arnold's attorney said. His lawsuit to Dorothy D. Michael May 15 was announced following the new court developments.

"Blackbird" helicopter, new two place craft built as a family vehicle (Aviation Week Feb. 22, p. 20), will be put on display for the first time early next month at Delaware, N. J., by General Motors Products Corp. The helicopter of the Florida can be loaned in a few days, says its cost will be less than that of a light aircraft.

Mass-week strike of production work

NEWS DIGEST



First Production Leascan Goes Aloft

SRF winning its prototype and ultimate cost, here is the first Lockheed L-10 powered by two, four-cylinder, 180 hp, to meet all the production line. Designed for a normal cruising speed of 180 mph, the Leascan will undergo certification as a new type transport plane. Among changes visible from standard Lockheed L-10 are passenger windows, fuselage structure being housing ADF and main engine, retractable wheels and new engine housing, 1,525 hp, Wright CNR engines. Line-ups it has a number of orders for the Leascan.

on at Curtiss-Wright Corp.'s Propeller Division ended last week when the DAVI members voted to accept a new company plan of a two-year contract and return to the Caldwell, N. J., plant. Terms of the contract: five-cent-an-hour wage increase with guarantee of another five-cent boost in a year plus additional lengthening and insurance benefits.

Financial

Reich Aircraft Corp., Wichita, Kan., declared two special dividend stock dividends of 25 cents each, the first since the company created equity quarterly payments after USAF canceled the T-16 contract last year (Aviation Week May 5, p. 7). The dividends are payable June 9 and July 9 to stockholders of record May 24 and June 24.

Fairchild Engine & Airplane Corp., Hempstead, Md., had net earnings of \$1,641,000 for the first quarter of 1954, higher than month profit in the company's history. Sales totaled \$16,915,000 (\$19,117,000 last quarter 1953).

Motorola Airlines reports a net loss of \$14,150 for 1953, a setback blamed on a subsidy cut plus increasing corporate charges for new Operating revenues totaled \$2,025,724, but overall expenses added up to \$2,039,874.

American Airlines will pay a 15-cent dividend, June 31 to common capital stockholders of record June 4.

International

De Havilland Comet 3 is scheduled to make its first flight next month.

Strengthened fuel system, improved performance and radio equipment will mark the six Vickers Viscounts tailoring transport ordered by Trans-Africa Airlines. First deliveries are scheduled for July.

Four F4U-78s, 3 officially in service to be a radio-controlled target drone version of the piston engine, two place fighter series used by Britain's Royal Navy.

Edward G. Gidley, chief test pilot for Armstrong-Whitely, was killed May 20 when a Royal Navy Wyvern attack fighter crashed and burned shortly after takeoff from RAF Beaufort, Devonshire near Exeter, England.

Two Sikorski HO4S helicopters have been delivered to the Philippine Air Force under the U.S. Philippine Mutual Assistance Plan. The cost of the two HO4S is \$119,000.

Japan aircraft production plan for fiscal 1954 will cover some \$1.4 billion worth of bombers, fighter planes, helicopters and their spare parts and equipment, a spokesman of the Ministry of International Trade and Industry stated. More than \$1.1 billion worth of this will be scheduled for export, it noted.

Fokker aircraft factory is taking over the wartime department of Royal Commission in Schiedam, Holland. The Netherlands. The letter firm has been in operation for 20 years and has worked with Fokker and Avondale on 440 Gloster Meteors for the Dutch and Belgium air forces.

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May 31, 1954

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NATURE'S



MISTAKE

Fortunately for Archie, the Archetype, he had no competition from any. Archie was the first bird and things in the air were pretty scarce at the time. Archie's idea of a reverse flight was to climb a tree and tear down on some poor, hapless eagle. Anything in the air came as quite a surprise in these days, so Archie usually caught his dinner and slept peacefully on the ground until the pinch of hunger forced him up another tree. Too bad nature didn't cool him a better for the job because, as soon as something came along that could flip its wings, the competition put Archie out of business. Today Archie is not even a minority, but the lesson of competition is still with us. Being properly cooled up for the job is more important than ever. If you have a cooling problem, here's one to the Berg Organization. Not only in having the best product in the world, properly cooled up, is your future safe.

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PERSONAL JET PROVED useful (below) shows configuration of new four-engine ordered by Royal Air Force. Adopted from the Alouette helicopter-powered Proton train, the new craft will have a 1,600-hp-thrust Armstrong Siddeley Viper ASV 5



CHANCE FIGHTER F10-3, seen in dramatic flight during (above), a field with some probes for aerial refueling (Aviation Week May 17, p. 10). Catches during it left little the new aluminum tubularly welded pod (above) used by the two-pit Navy fighters. The new bomber can be attacked after being in 27th air units.

**New U.S., British Jets
In the Military Lineup**





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WHO'S WHERE

In the Front Office

William Littlewood, formerly Aero-Can Aviation vice president, now has been named vice president-engineering development, successor M. G. Bond, vice president vice president-engineering development. George C. Van Nostrand, vice president manager Air de Mexico has been appointed vice president-engineering and maintenance, successor Walter H. Johnson, now vice president vice president. Van Nostrand also will continue to supervise the Mexico operation with F. J. Mullins as assistant general manager. Other Air de Mexico vice presidents: Arthur D. Lewis, planner; William C. Lawrence, engineering; John J. Carey, maintenance.

William Lamborn, vice president general manager, now vice president of McDonnell Corp., Northrop Aircraft subsidiary. Other McDonnell changes: M. W. Taffel, vice president; James M. Smith, vice president and assistant to the president in addition to leading foreign sales; Alex Collins is director of military relations and field service. E. Keith Goffle has been named special assistant to vice president and assistant general manager, Northrop Division, Kaiser Aircraft Products, Inc., Grand Rapids, Mich.

Gen. Leiford W. Miller, (USAF, Ret.), formerly vice president finance with Convair, has joined Engineering & Research Corp., Knoxville, Md. as assistant vice president. Miller was chief of USAF Budget and Finance Office 1957-1961. Milton A. Tracy, formerly deputy for material programs, office of the assistant secretary for aircraft of USAF, has joined the General Corp., Los Angeles as a member of the president's staff.

Honors and Elections

George F. Chrysler, vice president and manager, Fairchild Engine Division, Fairchild SAA Corp., M. F., has accepted presidency of the 1957 Aerospace Production Forum of the Society of Automotive Engineers scheduled for April 1957.

Charles H. Koser, general manager of Kaman Aircraft Corp., Burlington, Conn., has been awarded the Champion Junior Chamber of Commerce distinguished service award for outstanding contribution to Chamber in financing and guiding what has become one of Connecticut's leading industrial enterprises.

Changes

A. J. Berg has been appointed manager of events here for Canadian Pacific Airlines.

Kenneth G. Boyd, formerly vice president, manufacturing and production, has been named production manager, Wichita, Kan., has been named regional representative for Englehard Industries, Inc., Newton, Mass., at Wichita, Kan., and also has been appointed regional vice president for Englehard Corp.'s Aviation Division at Wichita.

(Continued on page 64)

INDUSTRY OBSERVER

Progress with atomic artillery has made obsolete at least one family of short range guided missiles designed around conventional warheads. Army planners feel slight range differential in favor of the missile is outweighed by the advantages of mobility and reliability of the weapon.

Development for Republic's B-401 increases an assumed saving assumption to bypass outside air around the target and land it directly to the observer for high speed operations. A separate target engine is not needed.

Aircraft Industries Assn. based of government, at its annual spring meeting at Williamsburg, Va., noted its stand on a policy of refusing to accept direct sponsorship of its members' research and development. It also has indicated that National Aircraft Show at Dayton will get more support from individual companies.

Royal Canadian Navy has accepted delivery on three Puma HUP helicopters. Based at Dartmouth, New Brunswick, they will be used on new Arctic patrol vessels, HMCS Labrador, to hunt submarines and rescue outposts.

General Electric is developing and will produce broadly number of defensive for control system for Boeing B-52 to look-up missile program at Acoma.

Phonix is preparing to lift the Army's 4,300-lb. 105-mm. howitzer with the H2IC Work Horse. First step is to qualify design for the helicopter. Sikorsky's H-19 has carried the 75-mm. pack howitzer, weighing 1,475 lb. Higer gun now has to be carried in three loads, assembled in the field.

Average maintenance and repair time per USAF aircraft was \$19,666 in fiscal 1953, and \$15,578 in fiscal 1954, a recent study shows. Estimate for fiscal 1955 is about \$19,000 for each plane.

Defense Department reportedly has directed Air Force and Navy to develop a new weapons system for all categories of aircraft. Plans would be assigned consecutive numbers after a letter designation of its status in a type standard to that used for jet engines. Air Force would get odd numbers, Navy even.

Completion of space parts requirements for the Boeing B-52 necessitates consideration of 30,000 to 90,000 component parts. As a result of a detailed study, USAF is publishing request questions for only 1,000 to 15,000 component parts.

USAF is seeking \$150 million for fiscal 1955 for the modification of inventory aircraft. Air Force has established the following program efforts for modifications: Combat planes will receive in the active inventory for one year after the modification is completed, non-combat aircraft two years.

Package; costs of aircraft parts have been reduced sharply because of a recent Air Force project which developed an exterior and exterior container. Exterior container is a cost less an aircraft; exterior container is used for surface shipment. Example of cost reduction previous packaging cost for C-119 vertical stabilizer was \$187.97, present cost is \$177.04.

The four cargo seats of the Douglas DC-7 will hold up to 16,000 lb. However, United Air Lines, went some effort to put the new Douglas plane into transcontinental service, has set cargo capacity at 9,000 lb. with 56 passengers and their baggage.

USAF is experimenting about reducing the lead time period in making aircraft. Officials note the reduction of lead time is compensated and in the end product. The average lead time for thousands of parts has been cut down by six months in the past two years.

Moscow's May Day Air Review

Reds' Surprise: 15,000-Lb.-Thrust Jets

- Big axial-flow engines indicate that Soviet gas turbine development program may be ahead of U. S., Britain.
- But observers say airframe design appears lagging, with new bombers definitely in the subsonic range.

By Robert Hoza

Report issued in the 1954 Russian May Day air show once Moscow (Aviation Week May 10, p. 14) to foreign observers was the appearance of 10 jet bombers powered by a large, new axial-flow turbojet engine powerful than any American or British engine now being.

Turbulent engines indicate that the new Russian model turbojet engine produces about 15,000 lb. thrust. Admirers of the big new Russian jet engine indicate the Soviet gas turbine development program now has forged ahead of both the United States and England.

Power is the key—The 15,000-lb. thrust Pratt & Whitney Aircraft JT-37 turbojet engine and turbojet is the most powerful American engine now being in production. It exceeds the British de Havilland Sabre 55, the 10,000-lb. thrust jet into the Soviet Union or the Bell P-61 B-14 American in production aircraft.

Engine power is the key to military aircraft development and because engine performance is at present the limiting factor on jet speeds of the current crop of American fighters and bombers, the sudden appearance of the Russian 15,000-lb. jet is regarded as particularly significant.

Turboprops are a smaller power class are well along in development in Soviet U. S. engine manufacturers but none has powered an aircraft in flight. U. S. projects in the 15,000-lb. thrust class.

- Pratt & Whitney Aircraft JT-37
- General Electric J47
- General Electric J48

Some of these engines probably will be used in combination with afterburners that can add up to 50% of the base thrust rating for short periods. It probably will be at least another year before any of these engines power a major aircraft in flight in the Moscow air show.

• Both Confidential—Some indication of Soviet confidence in their new jet can be gleaned from the appearance of the Russian heavy jet bomber—comparable in size to the Boeing B-52 (Aviation Week May 24, p. 14) and powered in fact by the new 15,000-lb. thrust jet—being flown over Moscow several times in two weeks during rehearsals preceding the May Day display.

In addition to the heavy bomber the new jet engine powered some modern bombers comparable in size to the Boeing B-47.

Russian axial-flow jet development stems directly from German engineers who began work in the Soviet Union after World War II. The Germans pioneered the axial turbojet design and then first power experiments and continued to follow its basic pattern throughout the war as control of the centrifugal-type compressor favored in the British.

Wernher von Braun's U. S. development of axial turbojets under Navy sponsorship during World War II, working independently of both British and other U. S. firms experimenting with aircraft gas turbines.

German development of the foundation of the Russian jet development was two German engines, the BMW 801 and the Junkers Jumo 210, both of which were in production during World War II in subsonic aircraft.

First power Russian jet fighters, such as the Yak-15 and the MiG-9, were powered by German axial-flow turbojet engines.

First power Russian jet fighters, such as the Yak-15 and the MiG-9, were powered by German axial-flow turbojet engines.

Subsonic Design—Concepts of foreign observers at the Moscow air show is that Russian engineers design a big gag behind Soviet powered development.

While the 15,000-lb. thrust turbojets are capable of pushing an aircraft past Mach 1, both new Russian bomber designs are subsonic and probably considerably slower than their B-52 and B-47 counterparts.

Both the heavy and medium bombers show a marked British, rather than American, design influence. Most particularly evident is the decision to burn jet engines in the wing root rather than along the fuselage as in current practice. The burned engine technique has been a trademark of British and high speed designs from the General Electric turbojet engine in the Vickers Valiant and Valiant bomber series. The burned engine appears a relatively thick wing root section during smooth performance to subsonic speeds.

Engine Division of General Dynamics Corp. was given a \$750,000 contract for 17 aircraft. Two of these will be VT-102A trainers and the rest P-102 interceptors.

Both the P-101 and P-102 are powered by Pratt & Whitney J47 jet engines. The McDonnell J48 jet engine has two powerplants, the General Electric and

ing USAF B-36 (Superfortress) and B-52 (Superfortress) designs.

The new Tupolev design is strongly reminiscent of the British Comet with swept wings, and tapered, swept-back wing of extremely high aspect ratio. Tiger is so marked on this border that the wing almost came to a point at their tips. The new Russian bomber appears to give about 300,000 lb.

It apparently is equipped with a radar bombing/navigation system. Its development delay occurred in relatively self-isolated for a modern jet aircraft.

Delayed progress indicates that the new Russian heavy bomber is still in the development cycle and cannot guarantee comparable to Boeing's present B-52 (subsonic) which is still several years away.

Appearance of a sophisticated navigation of the new Russian bomber wing is a surprise to foreign observers in Russia.

Nine of these bomber flew in the Moscow show, indicating that it is well past prototype development. It apparently is an Tupolev design with gross weight approximately 150,000 lb. and its two 15,000-lb. jet engines are located in the wing roots. It has high aspect ratio, swept-back wings.

• New Tupolev—Appearance of the two new jet bomber types over Moscow has stirred two general trends of opinion among foreign observers.

• Russian clearly are pursuing heavy USAF policy on long-range strategic jet bomber development. They are devoting a major effort to developing and building a long-range jet bomber striking force capable of engaging strategic and tactical targets against North American targets.

Concern of informed observers is that the Russians are still at least several years behind USAF's Strategic Air Command in everything except engine development. The concentration display of the two new Russian jet bombers over

Moscow is regarded as a statement effort to convince both domestic and foreign observers that the Soviets are reducing the tremendous advantage once enjoyed by USAF as strategic bombing capability.

• Russian jet bomber development (Aviation Week Feb. 15, p. 12, May 17, p. 30) was strictly an interim phase aimed at covering a developmental interval during which the big axial turbojet engine program still was lacking.

It appears that the Russians, after a relatively brief but stable effort devoted to turbojet development, now have turned their major effort toward a turbojet-powered bomber fleet aimed at reducing the immediate superiority of USAF's Strategic Air Command in the world balance of power.

In addition to the two new bomber types, the Russians displayed more than 50 new jet fighters, all advanced development models of basic MiG-17 and MiG-19—straightwing light bombers.



707 Accident Delays Flight Several Weeks

First flight of the new Boeing jet 707 Transport-Bombardier prototype will be postponed several weeks, the company says, as a result of damage sustained when the left landing gear jammed during taxi tests May 21 at Kansas Airport, Wichita. Part of the landing gear assembly, the 707 (type 707) was in the runway. Ground crew ditched damage done to the wing when the landing gear jammed. According to a statement given out by Boeing, no primary wing or engine structure was damaged, but a portion of the wing flap and skin structure behind the left wing was affected and replacement of the two-part jet section was required. It is pointed out that the 707's landing gear is designed so that in event of failure it will not rupture with high pressure or fuel leaks. Not a drop of fuel was lost during the landing, the company says.



Missiles Get Top USAF Priority

Intercontinental weapon development may be shifted to a special project similar to the Manhattan District.

By Charles O. Witz

USAF is giving top priority to the development of long-range missiles, although fiscal 1955 budget figures and statements indicate the overall missile procurement program is being reduced.

A past effort to place missile operations, now being referred to as the Manhattan District, may be launched to accelerate the intercontinental missile program. Recent shift of the General Electric Office to a position where it is responsible directly to Chief of Staff Gen. Nathan P. Twining was the first step in the direction (AVIATION WEEK May 17, p. 13).

Production Delays—Gen. Thomas P. Gentry, director of procurement and production engineering, told the Senate Appropriations Committee that USAF is emphasizing development and testing of missiles, limiting production to such items as the Minuteman, with completed development phase.

Since our government has lost, Gen. Gentry said, "an intensive review of this program has been made with the result that both the fiscal year 1953 and 1954 programs were reduced by delaying the production phase of certain missiles and concentrating development progress towards high-volume production."

However, Air Force said, in view of Soviet resources and the increased potency of the H-bomb, "everything is going to change." It was pointed out that an urgent reality situation, such as existed in World War II, made it

practical to set up the original Manhattan District spending on expense.

Modification Delay—The philosophy expressed to the Senate committee by Gentry is based on the fact that a large part of a guided missile, particularly the electronic equipment, is newly developed and not thoroughly proved. This, it was pointed out, is bound to result in a steady stream of modifications that will delay production.

USAF estimates show the following figures for expenditures on production of complete guided missiles:

1953 (actual)	\$662,777,584
1954 (estimated)	774,322,745
1955 (estimated)	903,447,080

Other expenditures for spare parts, repair, modification and auxiliary equipment will bring the 1955 guided missile total up to \$965,521,080, compared with \$675,498,741 in 1954 and \$243,735,129 in 1953.

USAF's report of funds covers the procurement of completed guided missiles, including production engineering, service testing, engineering changes, test articles, control systems, personnel units and guidance equipment for each type.

"These missiles," USAF says, "will be used for combined operational testing to improve their potential use, to train personnel in the operation of missile design, and to evaluate the equipment of units currently being activated and to be activated in the near future."

Program Guided—The program followed

to compare plans to obtain as quickly and cheaply as possible the missiles needed to ensure "maximum defense of the United States in case of an attack, the maximum tactical support of air and ground operations and the ability to operate strategically against the reduced capacity of an aggressive nation."

It is expected that costs on missiles will be "uncontrollable" even with expense, although USAF has made no definite public for security reasons. The B-61 Minuteman, a short-range missile, is operational and two squadrons are in Europe.

Program and program on Falcon, Kestrel, Hawk and other new weapons under military security wraps. The Bell B-61 (Javelin in ground) and the B-61 (Javelin in air) are the only missiles available to be announced (AVIATION WEEK May 15, p. 15, Apr. 26, p. 12).

Production—In his presentation to the Senate committee, Gentry offered an overall picture of the missile program. He told \$4,400 million, of which \$1,645 million already has been appropriated. The new total of \$2,755 million has been approved by the House.

General employment plan to arm "for the long pull" with a strength of 137 wings to be reached by the end of 1957. He told the committee USAF has been able to cut the quantity of missiles ordered, keeping the program within the capacity of an efficient industry and encouraging greater competition. He said production will be contracted at a rate substantially higher than past years.

Strategic Plans—On the subject of the Air Force production reserve policy, Gentry said, "As production levels increase, we will of necessity have to place certain plants in strategic status. However, it is our objective to retain as capability for early activation of these plants through mobilization personnel plans and contracts with industry."

"In other cases, where economically feasible, we will maintain pilot plants in order to retain the fastest possible buildup in the event of an emergency."

Landmark Reduction—Gentry said USAF plans to lay "the new missile contract which can be produced on contract with our plan for adequate testing of new models prior to quantity production for the combat inventory."

He told the committee that, on the basis of USAF's experience last year, there will be further reductions in missile inventories. He and the out-look "increased capacity of industry, further expansion of missile production in production, more experienced manpower and the elimination of national shortages."

Other points made by Gentry:
• New funds of \$175,990,000 are re-

quested for initial component parts and spare parts to keep new plants available for one year and provide necessary stocks for five and a half months. He and USAF had set up new procedures for control of expensive parts and made other economies.

Modifications of missile inventory, which the cost is not prohibitive, is limited to places that will remain in active service at least one year. For non-combat planes, the period is two years.

• USAF expects to spend \$15 million in fiscal 1955 for additional mobility tests. More than 50% of the money will be used to maintain facilities and equipment already owned by the government.

• Through reorganization, USAF has slashed the manpower necessary for procurement, production, contract administration, contract administration and quality control services.

McDonnell Sees New Complexity Problems

Growing complexity and an increasing number of changes point to new complexities before a second meeting, according to McDonnell, vice president-engineering of McDonnell Aircraft Corp., St. Louis.

Wings and tails will be thinner, making access to parts inside the surface more difficult, he said.

Shells will be thicker, demanding more accurate forming.

Structures that carry heavy loads will become heavier and more elements will be combined into a single part. The same goes for engine components, making and new engine components.

More tapered and tapered ribs will be required to get rigidity, lightness, tightness and smoothness. This also will require new machinery.

Outside contract will have to be modified. This will require changes in design, new tooling and assembly techniques, particularly in the joints.

More equipment will be required for welding. All that can be made smaller, lighter, more reliable and easier to install and maintain.

Mass integration and modification will be needed to combat heat at speeds in the Mach 2 range.

Beyond the lighter fuel, Perkins believes eventually more companies will be working on missiles than on combat planes.

New Beech Orders

Beech Aircraft Corp., Wichita, Kan., has received an order for three D-19S trainer-transporters from the Chilean navy, will deliver the first planes in August. Colombia recently placed an order with Beech for 10 T-14 Mustangs.

Report Scores Offshore Program

Senate also says American aid has turned European plane plants into "formidable competitors" of U.S. firms.

A "thorough and careful" report before any further investment is made to build up Europe's aircraft manufacturing capacity is urged in a report by Sen. Styles Bridges and Stuart Symington.

"America has contributed billions of dollars to help rebuild such basic industries as chemicals, steel, textiles and aircraft," the report declares. "These rebuilt industries contribute materially to the economic stability of the (European) countries. However, these industries have now become formidable competitors of the same industries in the U.S. Our own income has been and is being tending to shrink from this foreign competition."

It says that "every effort be made to induce NATO countries to place orders on order" as the security and other national capacity do not collapse when U.S. orders begin to fall.

Fast Contract—The Senate particularly objects to the \$25 million contract with Italy for assembly of 50 North American F-100A fighters by Fiat Co. declaring that it is "unconventional not only in that it requires the Italian people to buy in Europe."

The total cost of the 50 aircraft will be \$45.5 million, because \$20.5 million will be paid North American for final assembly parts being sent to Fiat and \$25 million for 50 transporters, the report states.

"This is an expensive precedent," the report comments. "It will result in the ultimate cost of these 50 planes being greater in excess of the price paid the 50 aircraft produced in the U.S."

The contract also requires a monthly payment of \$3,000 per plane by Fiat to NAA. But this is not two parts per month, the committee observes, because the U.S. government will pay the total amount in this unconventional operation.

It is noted that the contract was a "direct purchase" of the U.S. defense aid policy under which a contract for the North American plane should be established in Italy and little cost indication was given to price.

Only 1,250 of the 70,000 workers in the plant of Fiat will be employed on the aircraft contract, the report says.

Potential Production—Declaring that the potential production capabilities of aircraft plants in Western Europe are "enormous," the report makes these points:

• "The German aircraft industry in Prussia and Italy is a great source: 71% of the

workers employed by Fiat are German; in Prussia, the Communist-dominated zone, General Confederation of Labor (Gewerkschaften) workers over half the votes in elections in defense industry."

• "West Germany on the two plants of Avions Dassault, producing the Mystere IV with 14,000 workers, is far above normal and would compete seriously with the best in the U.S."

• "Presented of Britain's Hawker Aircraft Co., producing Hawker Hunter with U.S. financing, 'are highly capable of producing aircraft.' Their company is involved with American production."

• "Of the 100-plus programmed European aircraft being quickly followed by NATO countries, 'more than two-thirds are in a sufficiently advanced stage of construction so they could be used in an emergency.'"

• "In view of the Spanish aircraft production, 'it is not surprising that both Europe and North Africa could be quickly re-armed.'"

Bridges made the two-week inspection tour as a representative of the Senate Appropriations Committee and Symington as a representative of the Armed Services Committee. The Appropriations Committee, of which Bridges is chairman, will consider fiscal 1955 funds for European defense assistance.

Contract Methods—Second—The report objects to the method of letting contracts for European aircraft. "All amounts are first agreed to between the U.S. government and the foreign government, then an agreement is reached on a negotiated price basis in how many planes and/or parts will be produced, for the sum already decided."

It made these observations on U.S.-financed aircraft programs:

• **United Kingdom.** Two contracts provide \$140 million for purchase of 965 Hawker Hunter interceptors. One contract is a delivered unit price of \$157,808. \$12.5 million for 377 Sea Hawks at a unit price of \$119,723. Delivery of Sea Hawks commenced a year ago. Delivery of the Hawker Hunter contract was scheduled to commence in March 1955.

Hawker Aircraft Co., together with its associated companies, could produce 100 Hawker Hunters with a minimum of subcontracting. Although contract authors show a high degree of care in cost and time, "the report says, 'unusually and production details



Connie Radar Picket

First photo of Navy radar ship since completing a Lockheed WV-2 Super Connie loaded with radar equipment said a carrier, such as the USS Oklahoma, has radar the plane's aid. Day or night the H was WV-2 was one of the high altitude on the orbits of Navy task force, said radio

"Connie" activated its beyond the capabilities of the first by the plane's height. If an error came up on its detection data, the WV-2 crew can wait the first to take control. USAF was under Super Connie radar plane, designated as the RC-44C (Aviation Week Sept. 24, p. 17).

How Airport Aid Will Be Sliced

State	Allocation of \$75 of \$100 million for fiscal 1955	Allocation of \$40 million for fiscal 1955	Allocation of \$100 million for fiscal 1955	Allocation of \$100 million for fiscal 1955
Alabama	\$17,800	\$779,777	130,000	253,000
Alaska	184,000	184,000	184,000	184,000
Arkansas	123,000	252,000	144,000	40,400
California	546,000	151,000	141,000	104,000
Colorado	150,000	150,000	150,000	150,000
Connecticut	10,000	112,000	100,000	100,000
Delaware	75,000	75,000	75,000	75,000
District of Columbia	80,000	80,000	80,000	80,000
Florida	150,000	150,000	150,000	150,000
Georgia	275,000	154,000	150,000	150,000
Idaho	100,000	100,000	100,000	100,000
Illinois	127,000	127,000	127,000	127,000
Indiana	100,000	100,000	100,000	100,000
Iowa	100,000	100,000	100,000	100,000
Kansas	100,000	100,000	100,000	100,000
Kentucky	100,000	100,000	100,000	100,000
Louisiana	100,000	100,000	100,000	100,000
Maine	100,000	100,000	100,000	100,000
Maryland	100,000	100,000	100,000	100,000
Massachusetts	100,000	100,000	100,000	100,000
Michigan	100,000	100,000	100,000	100,000
Minnesota	100,000	100,000	100,000	100,000
Mississippi	100,000	100,000	100,000	100,000
Missouri	100,000	100,000	100,000	100,000
Montana	100,000	100,000	100,000	100,000
Nebraska	100,000	100,000	100,000	100,000
Nevada	100,000	100,000	100,000	100,000
New Hampshire	100,000	100,000	100,000	100,000
New Jersey	100,000	100,000	100,000	100,000
New Mexico	100,000	100,000	100,000	100,000
New York	100,000	100,000	100,000	100,000
North Carolina	100,000	100,000	100,000	100,000
North Dakota	100,000	100,000	100,000	100,000
Ohio	100,000	100,000	100,000	100,000
Oklahoma	100,000	100,000	100,000	100,000
Oregon	100,000	100,000	100,000	100,000
Pennsylvania	100,000	100,000	100,000	100,000
Rhode Island	100,000	100,000	100,000	100,000
South Carolina	100,000	100,000	100,000	100,000
South Dakota	100,000	100,000	100,000	100,000
Tennessee	100,000	100,000	100,000	100,000
Texas	100,000	100,000	100,000	100,000
Utah	100,000	100,000	100,000	100,000
Vermont	100,000	100,000	100,000	100,000
Virginia	100,000	100,000	100,000	100,000
Washington	100,000	100,000	100,000	100,000
West Virginia	100,000	100,000	100,000	100,000
Wisconsin	100,000	100,000	100,000	100,000
Wyoming	100,000	100,000	100,000	100,000
Total	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000

Note: Federal airport aid was authorized by the new Administration in fiscal 1954. This Administration is seeking to use 10% of fiscal 1955 funds in its fiscal 1954.

Commerce Lifts Airport Aid Block

An Administration request for approximately \$50 million for fiscal 1955 airport aid does not hinge on enactment of legislation increasing the Commerce Department's control over the allocation of funds.

Earlier legislation that the Administration would make airport aid contingent upon the new allocation authority was removed by the Deputy Undersecretary of Commerce to Transportation, Charles Deering, in testimony before the Interstate and Foreign Commerce Committee.

He said the Administration favors a "substantial cut" in fiscal 1955 airport grants and that the request "is not precluded" upon passage of legislation giving Commerce Department additional control over allocation of funds.

This removes the main barrier to the fiscal 1955 aid program. The Senate Commerce Committee's authority against widespread opposition in Congress.

- Sharp Split—Hearings before the Commerce Committee showed a sharp split among members groups on the Administration program which would:
 - Run funds for terminal buildings.
 - Increase from 25% to 50% the "discretionary" portion of airport funds.
 - Under present law, 75% of airport appropriations are allocated to states on a basis of population and area. This would be reduced to 50%.
 - Require that projects be "of sufficient national importance," as determined by the Secretary of Commerce, to receive federal aid.

- Provide that unused funds appear before states be made available for discretionary use.
- Aid California—Commerce Dept. says Charles Deering said the Senate Commerce Committee that projects would be "of sufficient national importance" would "by no means limit the airport aid program to match a few of the largest airports in the country."

He said the criteria of national importance to be met would be 1,000 or more passengers per year or a land area of 10,000 or more acres, or a combination of these factors, with 100 passengers equal to one land acre. Deering reported that 760 airports accounted for 99.6% of the total domestic scheduled passenger airline traffic, with the following list:

- Other national highlights:
 - Air Transport Assn. and Airport Operators Council supported the Administration program.
 - National Association of State Aeronautics and Municipal Airport Authorities opposed it.
 - Two Democratic members of the committee—Sen. Mike Mansfield and Lester Hunt—opposed that the measure would result in the development of existing major airports and would be detrimental to new and small airports for feeder and feeder airports. "How would you ever get to know this, if airport aid depends on existing traffic?" Mansfield asked. "How would you ever get to know for developing feeder airports?"
 - Sen. John Bricker, the committee

chairman, objected to restricting aid commitments for federal aid for terminal facilities.

No committee member opposed the Administration's proposal. AIA View—Supporting the increase in the Administration's aid, AIA's secretary, J. D. Darned, declared that "as pressure under the Federal Airport Act has shown that there will never be enough federal funds to go around. Thus the federal government, by some objective, selective process, must pick out those airports which have a self-sufficient degree of national importance to warrant federal financial aid."

He urged that federal agencies be required to pay rentals for space in terminal buildings at federal aid for their construction is limited.

Fred M. Glass, director of aviation for the Port of New York Authority and president of the Airport Operators Council, recommended that the discretionary fund be increased to even more than the 50% proposed by the Administration. "The greater the amount of the discretionary fund, the greater the good," he declared.

Glass said the Administration's proposed criteria under which 760 airports would have sufficient traffic to warrant federal aid is too limited. The council is composed of the management of 16 of the country's largest airports.

Opposing View—A. J. McManis, executive secretary of the National Association of State Aeronautics Officials, called for complete elimination of a discretionary fund, leaving the total airport aid appropriation for airports must remain the same under a formula laid down by Congress. He said Congress's plan to base airport aid on the amount of traffic activity already existing at an airport is contrary to the national policy "toward decentralization of industry and business to reduce the possible disturbance effect . . . by an acute bombing attack."

He suggested that airport appropriations be made on a formula basis.

Randy Hamilton, director of the American Municipal Assn., representing 12,000 cities, declared the Administration's proposal would leave "to terminate when an arbitrary parking of agents pulled out of a lot" the determination of what airport projects have "national interest." He objected to "tossing and juggling the list of those airports eligible for federal aid by narrow, home-made definitions."

Declaring that the nationwide "service" concept of airport of the 1946 Airport Act would be demolished by the Administration's proposal, Hamilton asked: "Can anyone definitely determine that an airport which presumably is not in the national interest today will not be so tomorrow?"



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Senate Restores Cut In NACA Budget

Senate Appropriations Committee approved \$56.7 million for fiscal 1955 activities of the National Advisory Committee for Aeronautics, reversing \$3.4 million that House action had eliminated.

The House reduced the Administration's original request of \$58.2 million for NACA by a total \$4.9 million. NACA asked the Senate committee to restore only \$3.4 million, which included \$3.1 million for administrative expenses for continuing operation of three military plant workshops, \$420,000 for experiments on a jet by day, named for supersonic tests and \$151,000 for a new rocket facility at the Lewis Flight Propulsion Laboratory.

Committee Panel Law-NACA's fiscal 1955 expenditure will be on a substantially lower level than this year. The \$56.7 million budget originally proposed by the Administration compares with NACA's current year budget of \$62.4 million.

Regret reduction is on the contract program. The \$4.6 million (as passed for fiscal 1955) compares with a \$41.4-million program for this fiscal year. The House is expected to agree to restore to \$271,000 out of the \$4.6 million program is recommended by Senate Appropriations Committee. This provides for:

- Ames Laboratory. Building a new test section for an engine wind tunnel to increase supersonic capabilities.
- Langley Laboratory. A new facility for

research on landing and rollout characteristics of high-speed airplanes.

Bridges Withdraws 'Rate War' Legislation

A move that would open the gate for a rate war among airlines and with railroads for domestic business temporarily has been blocked.

Sen. Styles Bridges withdrew an amendment to an appropriations bill that would permit the Defense Dept. to contract at five or reduced rates with air carriers on the assurance that the matter would be taken up by the Senate Interstate and Foreign Commerce Committee.

The committee's chairman, Sen. John Bricker, has introduced the Bridges amendment as legislation which is now pending before the committee. Civil Aeronautics Board and the three competitive airlines—American, Air Transport, and Independent Military Air Transport—have vigorously opposed the proposal.

Two flights—Boeing co. extended its provision intended to recognize the government for land grant rights, the railroads have been able to find more than enough for military traffic (Aeronautics News, p. 10).

In addition to fighting for repeal of this provision permitting railroads to

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Civil Aircraft Backlog Drops 7%

Backlog of undelivered civil aircraft of 3,000 lb. or more weight and over totaled 331 at the end of February, 7% below January.

Shipments during February, measured by airframe weight, amounted to 1,444,164 lb. This represented a major gain over the previous month.

	1954 February	1953 January	1954 February	1954 January	1953 January
Complete aircraft	148	174	162	154	247
By weight of aircraft					
Less than 3,000 lb.	210	214	216	194	674
3,000 lb. and over	30	24	26	54	71
By number of planes					
Up to 5 place	161	211	118	115	674
More than 5 place	37	27	36	40	71
By total value of all orders					
Up to \$100,000	201	211	118	115	674
Over \$100,000	25	24	36	40	71
Total value of complete aircraft and parts (500 aircraft)	\$45,279	\$30,490	\$24,805	\$24,420	\$49,819
Aircraft total	\$6,712	\$5,132	\$3,132	\$2,132	\$4,911
Aircraft parts	\$7,508	\$5,358	\$3,673	\$2,288	\$4,908
Total value of aircraft engines and parts (500 aircraft)	\$51,434	\$31,405	\$21,673	\$21,288	\$51,021
Engine total	\$2,081	\$1,482	\$732	\$592	\$1,482
Engine parts	\$2,353	\$1,923	\$941	\$1,696	\$1,940

Source: Department of Commerce



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offer reduced rates for governmental business, air transport services now are faced with tighter flight to prevent Defense Department from capitalizing on the situation and get out sales from airlines, as well as air.

CAB Study—In a letter to chairman John Backer of Senate Commerce Committee, CAB vice chairman Hal Orr, Denver, declares:

"The business of the Department of Defense represents a significant portion of the air transportation business. To permit the business to be controlled by air carriers at free and reduced rates, initially except from the controls applicable to the rates available to other users, would be inconsistent with the policy of the Civil Aeronautics Act and would obviously impair, if not altogether destroy, the effective enforcement of existing rate policy with respect to the industry as a whole."

"To the extent that the Department of Defense would be able to buy property and passengers transported at rates as reduced rates, the situation is no case to the carrier-owned thereby would be the long run here to be made up either by increased charges to the public or by increased governmental financial support."

Replies say his intention is upon seeing the proposal was solely to save Defense Department money.

June 18 Deadline Set For C-46 Comments

Industry has until June 18 to submit comments to Civil Aeronautics Board on the two modification proposals (AVIATION WEEK Apr. 12 p. 18) for the C-46 transport.

Under consideration are the proposals of Aerofit Engineering Foundation, Inc., which would cost approximately \$15,000 per airplane and Air Carrier Engineering Services, which would be less than \$10,000 per aircraft. The latter proposal is backed by Air Trans, Inc.

►Comments limited—CAB set July 1

as the deadline for modifying the C-46 is to comply with the transport category requirements. AEF's proposal includes certain pilot training and aircraft maintenance provisions which are proposed to govern the retention of accidents involving pilot error and deficient aircraft maintenance.

However, the Board requests the manufacturers to be that involving the latest certification status of the C-46. Comments are asked only on aerodynamic and performance aspects of the proposal.

But if AEF's modification program has been completed by Civil Aeronautics Administration.

An AEF-modified C-46 was to be given final test May 25 at Burbank, Calif., under the supervision of CAA's Fourth Region.

AEF previously has a training plan in progress for giving chief pilots and CAA inspectors a complete checklist on the C-46 at the CAA Aeronautical Center in Glendale, Calif., Glis, in cooperation with CAA. The program is designed to make the pilots familiar with the aerodynamic and performance limits of the airplane and to give them instruction on methods of preventing the occurrence of these pilots.

Examiner Approves Bonanza Renewal

Bonanza Air Lines' application for certificate renewal is approved by Civil Aeronautics Board Examiner William W. Brown. In his initial decision on the case, Brown concluded that the Nevada airline's certificate should be extended to Dec. 31, 1957.

Bonanza's decision becomes final May 25 if there are no exceptions. Under the certificate, Bonanza could operate between Reno, Nev., and Phoenix, Ariz., and the intermediate point, Hawthorn, Nev., Los Vegas, Kansas and Prescott, Ariz.

Bonanza would also be permitted to fly between Phoenix, Los Angeles and Burbank, Calif., via Yuma, Ariz., El



Piper Delivers First New Apaches

Six First Apache twin-engine, four-place helicopters placed last up at the company's Rock River, Ill., delivery point to delivery to distribution. First plant has been received by R. H. Brookings, Cordell Aircraft Sales, Charlotte, N. C., who had

the highest percentage gain of sales over his 1953 quota of 11 of Piper's 100 horsepower helicopters. Thirty-two Apache helicopters are currently in production as on flight and Piper said for building one plane every day by June 1.

Cessna Gives "Wings" to Army Words



When plane flies over — when field commander is engaged, complemented or surprised, the Army often depends on Cessna L-19's to report it and supply the necessary L-19's are used for observation, photography, equipment supply, military traffic control, area control, etc. In fact, L-19's are almost as valuable to the highly trained Army aviators who fly them. Cessna has been building these rugged airplanes and delivering them to U. S. Armed Forces ever since 1941.



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Working without units with complete control is a real job for L-19's. When speeds under the wings "fly only" from over any terrain, faster than most, without undue vibration, low stall speed, 218 S.P. engine performance and short take-off and landing ability make this possible. And L-19's require very little maintenance than any other Army airplane.

CESSNA AIRCRAFT COMPANY, WICHITA, KANSAS



Keeping Contact "Up"

When Army ground units are separated from each other by terrain obstacles or long distances that prevent radio contact, L-19's function as airborne radio stations, relaying messages to one group or another.

How Convair Idea Men Map the Future

Planning office must anticipate tomorrow's needs, bring together thinkers and doers.

By William J. Coughlin

San Diego, Calif.—Convair's Thomas G. Langley, Jr., founded an airplane here the other day and took off for Chicago for a session with staff, engineers, and Gen. Curtis LeMay, boss of the Strategic Air Command.

Gen. LeMay is not a man who talks to strangers, but Tom Langley does in an informal command. He sticks to trade ideas.

The 34-year-old vice president of Consolidated Vultee Aircraft Corp. is motivated for planning to president Joseph T. McNamara. He and his staff are responsible for much of the long-range thinking upon which Convair's future depends.

Knowing an idea is conceptually correct for a big aircraft requires to handle something like a new airplane, a wing span, a tail fin, or an instrument panel. These are things you can design, construct and produce.

An idea is something else. How do you handle it? Where do you find it? What do you do with it?

Each aircraft company has found its own answer to that problem. At Convair, the task falls to Langley's Office of Long Range Research.

Langley operates by involving—he's been to Washington 15 times in the past 12 months—and by talking. "Two people are helpful unless they communicate with each other," he says.

The Long Range Planning Office therefore is a collection of communications tools rather designed to bring together ideas and the people who can do something about them. Ideas are not an immediate priority of equipment are the airplane and the airplane itself.

The department has 10 persons in it, including the chief engineer. "We don't need a huge department," Langley explains. "We have to be sure we are engaged thinking of our own, as equal nations in the way as a catalyst agent. Sales, engineering and other departments have planning responsibilities, it is our job to not let them get away from that. They planning is integrated between the operating division and with the general offices."



COMMUNICATIONS CHIEF Langley (left) discusses future project with J. T. McNamara, Convair executive vice president, in C. Schell, vice-president.

High Level—Langley reports to the president on an equal level with the vice president of engineering and sales. This is in line with McNamara's aim to be a total coordinator of sales and engineering. He is not responsible for either of them.

From 60 to 100 ideas a month are forwarded through the Long Range Planning Office, originating from the company's engineering staff or the chief executive's information for the department—or from the sources themselves. But there is more to the job than sifting through ideas from within the company.

Langley has staff and three assistant chiefs of the operating divisions must they constantly discuss of current technology and political thinking.

"You have to make sure the national policy is," he says. "An idea, do have requirements for the future. For instance, the general shifting of defense policy during recent months under the Eisenhower Administration toward emphasis on air weapons for air defense and defense. This has significant implications in its weapons systems that we must be aware of."

The planning department must be aware of what the nation's policy is in the way of defense and defense systems at that time.

There are other ideas which are not, to the extent, might be able to do it. From a technical point of view.

Important Task—Duncan reports to the company's chief executive officer. For example, Convair has withdrawn from at least five recent major competitions for aircraft programs. In one the recent request by the military was considered by Convair to be too close to military to other American and Soviet aircraft likely to be in the hands at that time. In the other instance, the performance of the airplane itself would be technologically more advanced by Convair's estimate at least, than other elements of the system in which it is to operate.

"We don't pressure me to consider the idea which is outside military requirements," Langley says. "That would be neither direct, nor was. But, in this business, we have to face the hard-balled fact that the military usually rejects ideas as early as possible. Projects that are rejected."

"Back in the year after World War II, the service branches launched over two dozen serious programs of new aircraft. Of those, only one has survived. It is still alive, though others have been initiated. In competition like this, we have lost more than one out of three."

The planning department must be aware of what the nation's policy is in the way of defense and defense systems at that time.

country's defense needs for the future.

The planning department also must follow through on current production schedules and engineering projects. "You can't ignore the idea which you have what you're already doing, and what your capabilities for taking on and meeting new obligations may be," Langley says.

There can be no doubt that one of the department's most important services to the company is not written into its charter. Through personal contacts with Convair's customers, particularly the military, the planners keep posted on current thinking and new technology level a hand to commercial and military users.

Planning—Tom Langley's staff, though small, is composed of what he calls "good old-fashioned thinkers." It has five staff assistants.

R. D. Williams, senior Navy lieutenant, handles strategy and maintains the picture of where the company stands according to schedule in its series of projects of any given moment.

M. M. Blom, engineer and expert analyst in the field of commercial aviation, is "inside man" for the firm, handles the evaluation machinery for new ideas, and compares the company's monthly report which keeps Convair's executives posted on current planning.

J. H. Denney, West Point, and fighter pilot, who was an Air Force aircraft designer, is an engineer.

Lee Mearns, also an ex-fighter pilot, is a civil, defense designer who has been with Convair since World War II.

Ted LeMay, formerly in the planning department of the du Pont company, came to Langley's office from the Convair prior to 1950.

Results of the long-range planning department that he has been responsible for to the last time in planning. McNamara now coming off smoothly in the result of decisions made several years before. Langley's office was not up.

For instance, Langley points out, the fact that the Eisenhower policy of emphasis on aerial refueling and other considerations led to a great Convair complex of projects including intercontinental bombers and supersonic interceptors and air defense missiles is a credit not only to McNamara's insight, but to the planning department, with such as Jack Nash, now executive vice president, and R. C. Schell, engineering vice president, keeping ever into the present planning began several years ago.

Executive Duty—When Gen. McNamara was named president in April 1952, one of his assignments was to introduce management stability at Convair. Stability requires long-range plan-

ning. That was the formal start of the LRP office.

Langley had resigned from the National Security Resources Board in May 1951 to join Consolidated Vultee as assistant to the president, at the urging of Convair board chairman Fred B. Olin. He became a vice president in November of that year, at the age of 30.

He already was at work in the planning field when McNamara arrived on the scene. The new president asked Langley to draw up a charter for a dual long-range planning department. When Olin mentioned that, Convair, with divisions in Fort Worth and

Davenport, Tex., and Phoenix and San Diego, Calif., was running into trouble in its planning. With so formal organization that processing new ideas, engineering staffs were at work in a wide number of fields without coordination. The company feared, itself with not enough engineers to go around but still taking on new projects.

Under McNamara's regime, that is changed. If the Ft. Worth Division, for example, comes up with a new project proposal—engineering writes the design which is perhaps suggested by a customer, either military or civilian—the division passes the suggestion along to the long-range planners and

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as the next topic begins its own section. The division makes a recommendation for approval and passes this on to LRP.

► **Right Roster:** Then, Langham and his staff see that the idea reaches the right staff people, for discussion and recommendation to McNamara for his final decision. Due to this back-and-forth system, the LRP staff sometimes can obtain a decision answer as an idea within an hour or two after it reaches Langham's office.

"We are not supposed to be experts," Langham says. "We just see that the captain gets together."

Langham, however, must make his recommendations to the president based

upon the conclusions of the experts. New product proposals are analyzed on the basis of three questions:

- Can we do it?
- Is it feasible?
- Does it fit?

The last perhaps is the most important. Gates has outlined in a 10-year program the basic areas of interest of the company. These at present include both military and marine applications of the strategic bombing system, the air defense system, tactical air systems, the Navy air mission, military logistic services, commercial air transport system (land-based), both passenger and freight commercial air transport system (water-

based), both passenger and freight, nuclear products, and electronics.

If an idea does not fit into these basic areas, it usually is rejected. The long-range planners also consider suggested ideas in the 10-year plan.

► **Idea Origins:** Where are new ideas found? A weapons-system analysis group is at work in such divisions taking a long-range look at military requirements. A consolidated report of their activities is furnished to the LRP staff each month. That is one source.

Preliminary design, or often engineering sections, may come up with suggestions. Customers, both military and commercial, may bring requirements. Suggestions come from individuals inside and outside the company. This may be top management executives or sales in new proposals.

Then, of course, there is the Long Range Planning Office itself. Proposals originating here may also be referred to the appropriate division for preliminary evaluation. Langham's staff makes its recommendations to the president only after receiving this evaluation.

In all its activities the planning staff depends largely upon personal contact with personnel kept at a minimum.

It is a good bet that when Langham would up his most recent work with Gen. Lemay he had developed some leads which will help General in formulating his long-range bomber plans to the best interests of SAC. It is an equally good bet that he left a thought or two with the SAC Commander as to how Crosley might be able to contribute helpfully to the SAC mission in years to come.

For Langham believes firmly in the exchange of ideas. That, he says, is the main job of his research department.

Aerial assault on disease



Franklin-Powered Bell Helicopters utilized for war on malaria in Colombia

Around Colombia's swarming jungles and covering mountains, six Bell 47D helicopters are waging a lethal disease campaign against the malarial mosquito. Operating over its viridly, rugged country, dependent on both aircraft and engine is a crucial need. The worldwide service record of Franklin-powered Bell helicopters, coupled with the Colombian Air Force's experience with five similar ships, dictated the choice for this challenging assignment.

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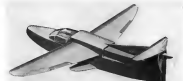
It's a complex system but hardly a challenge to the Crosley designed-in code and the control, after engine, shipboard, ground, mobile or fixed radar, and some.

Crosley defense production not only spans the whole field of electronics but has an equally wide spread in the mechanical and electric mechanical fields, from experimental to complete weapons systems.

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New Wing Cleans Amphibian Lines

A four-flap variable-incidence wing is one of the unusual design characteristics of a pair of proposed amphibian aircraft planned in a private venture by a veteran aircraft engineer.

Hille Petrossian of Westport, N. Y., told Aviation Week that his aim was to avoid the poor maneuverability, low lift, high cost of gravity and high thrust limits that have handicapped amphibious aircraft in the past. His low-drag flap, he explained, by using variable incidence to produce high wing lift independent of half angle of attack. This would high lift angle for landing and takeoff, and then decrease to overlap at the airspeed, and also decrease the stepped hull.

Petrossian says Petrossian, the wing design is inherently self-aligning.

Fixed Propellers

Both aircraft are aimed at the private-market for utility aircraft.

• P-12 is a two-engine single-engine monoplane wing a pusher propeller and features a stepless hull with oceanic function. Design gross weight at 2,800 lb. Cruise speed at sea level has been estimated at 141 mph.

• P-13 is a four-engine jet plane of similar construction design, powered by a light turbine engine. Weighing in at an estimated maximum of 3,700 lb., this version would be expected to cruise at about 201 mph at sea level.

Petrossian has not estimated the cost of either model, pointing to vast steel export control prohibitions have been built before hanging a price tag on the ships. But he has estimated that the flat pusher P-12 could be designed, built and tested through flight testing for about \$175,000 by a small project group of five designers and crafts men working with minimum overhead the about 12 months.

The propeller-driven amphibian has reversed most of Petrossian's situation, as it drives development has been only a tentative design conception.

Wing Details

Sheet of both proposals is the named wing design. It differs from the conventional concept of a variable-incidence wing in two points.

• Each panel is free to move independently of the other; one of rotation is possible, on the chord plane, and put ahead of the most forward corner of pressure.

• Each panel is semi-controlled by a rib at the leading edge, the rib's control column rotates the ribs, which in turn control the motion of each panel.

According to Petrossian, the method will permit the hull to move in its natural tilt angle with respect to either air or the water surface. By moving only the wing lateral of the hull-wing combination to get desired angles of attack, he is able to avoid the need for compensating the hull attitude.

A water takeoff can be made with the wing in maximum drag position for most of the run, as reaching takeoff speed, the ribs are pulled back, the wings move to a high angle of attack and the aircraft lifts off the surface.

The Structure

Petrossian expects to build the hull of milled or laminated fibrous glass, with internal bulkheads bolted into welded aluminum joints. The wing panels, ribs and hull are constructed as conventional designs in aluminum alloys.

The engine-Lapwing 125 hp, available to be housed in the hull and will drive the propeller by an extension shaft. A cooling fan, similar to those present in helicopter practice, will also serve as a shield to

H. S. Petrossian has about 20 years of aircraft design experience after his bachelor's graduation from New York University. He worked for Grumman, Republic, Sperry-Randolph, Hughes Helicopters, and currently is chief of engineering with East Coast Aeronautics, Inc. He is an Aviator's Fellow of the Institute of the Aeronautical Sciences.

smooth out engine vibrations.

Loading gear is tricycle and retractable manually. Main wheels will have brakes. The water intake returns into the base of the air intake and will be controlled by the same system.

Cockpit seats two and is conventionally equipped. The control column is rigid for themselves to offer seat, and dual engine controls are installed. Landing and wind-pulling are used.

Control System

Down or differential motion of the wing panels provides lateral and longitudinal control for Petrossian's proposals. Motion of the control column moves a large main rib which is on the wing panel trailing edge at about the midline.

When the rib deflects upward, the wing trailing edge is forced downward, increasing the lift of the panel, the opposite action also occurs. In differential operation, rotation of the control wheel will decrease deflection on one side rib and increase it on the other.

As the wing panels approach the stall, the center of pressure moves back toward the mid-chord point, increasing the pitching moment by a factor of about 10. As the wing tips, the air is compressed by the negative lift moment and causes the panel position to the stalled angle of attack.

In addition, separation of air over the top of the wing over the stall will decrease lift effectiveness, and further guarantee that the panel will not be forced to the stall point.

Stability

No pitching can be encountered by the hull by the wings, because of the first-order lag between the panels. Conversely, no roll pitching can show up in the wings.

So Petrossian has been able to design the horizontal tail just large enough to provide pitching stability to the hull and to handle normal trim. Roll and yaw are independently of each other; ribs control the wing attitude, and the tail control the hull angle.

Lift and drag forces can be applied into a single lever system applied to a float point on the hull. Petrossian says this method of control is very similar to the behavior of



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Performance

For the FA-7 prop-turbine engine, performance has calculated these performance figures:

Maximum speed at sea level, 152 mph; cruise speed using 60% reduced rated power, 144 mph; stall speed, maximum gross weight, 16 mph.

Sea level rate of climb has been estimated at about 905 fpm; average ceiling is 77,900 ft and absolute ceiling is 14,200 ft.

Thrust-to-weight ratio is 1.04:1.

Weight has been calculated to be 505 lb. Performance figures for the FA-7 jet also show these values:

Maximum speed at sea level, 231 mph; cruise speed at sea level, 200 mph; stall speed at maximum gross weight, 19 mph.

Range is figured at about 530 miles, and the endurance at cruise speed is 2.5 hours.

Georgia Tech Gets Martin Endowment

The Martin Aircraft Scholarship Fund has been established at Georgia Institute of Technology by two stu-

dents of the Maryland aircraft company.

Cliff M. Braker, board chairman and president of the Glenn L. Martin Co., and J. R. Wharton, vice president in charge of finance, made available an endowment of \$16,000 for full-tuition scholarship grants for Institute co-operative students from Maryland and the District of Columbia.

These students, like others under the cooperative plan, will alternate every quarter between study at the Institute and a work period at Martin or other participating firms. They complete eight quarters in the four-year period of the cooperative plan, and then stay at school for a complete fifth year.

First award will be made to an entrant from the 1956-1957 academic year, with preference given to residents of Maryland or the District of Columbia, and special consideration given to eligible sons of employees of the Martin company.

THRUST & DRAG

A new approach to English for engineers has been introduced at Rensselaer Polytechnic Institute, and it seems like a good idea. Students will be taught how the language operates and how it is used, and they will be part of the course.

The aim is to make engineers more communicative in reading and more understandable in writing.

No more will the tech have to labor—as they once did—through Victorian literature. For a change, they'll be able to read and direct reporting, or report, speeches and regulations in stead of wading through the ponderous phrases of the writers of the late nineteenth century.

This teaching method seems to typify trends in engineering education toward the more informal and more useful study aids. RPI isn't alone in the field, if you haven't done it lately, look at the current catalog for your alma mater. The change is certainly probably a bit overdue.

That's as it should be. Engineering is a rapidly expanding field, and education methods must keep pace with the means. Specialized courses, cooperative plant with industry, seminars, field trips are a vital part of the engineering student's education.

Another thought: It's getting just around here. When you go back to the campus, take some out to talk about educational methods with some of the pros. They'll want to hear your ideas, and you'll enjoy hearing theirs.

—DRA



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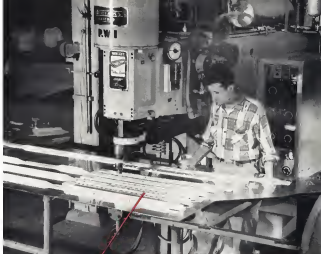
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Spotwelding .240 75st Aluminum Stringers to .081 75st Clad in Wing Section on F-84-F

These heavy section stringers are a Republic design improvement in wing structure of the battle proven F-84-F Thunderbolt. This instance of improved design with resistance welding is not unusual—Republic design engineers are specifying five times more resistance welding in wing assemblies and three times more in fuselage assemblies than ever before.

The advantages of resistance welding in both aluminum and jet engine fabrication are well known. Aircraft and Military specifications are most easily satisfied and maintained by Resky patented Three-Phase welders. That's why approximately 80% of all the resistance welding in aircraft fabrication is done in Resky machines. Write for Bulletin 13487 for information on Resky Type BT torch welders.

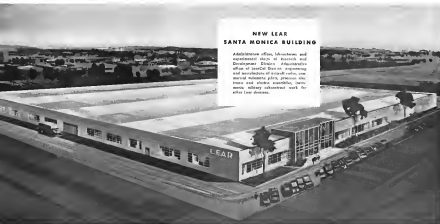
The Resky Type BT welder shown above is one of many at Republic proving in daily production Resky's basic thinking of making designs to do more useful work at lowest operating cost with maximum reliability.

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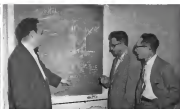
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PROBLEMS are what keeps Aéro Associates in business. This is their formula.

They Sell Analytical Engineering

By David A. Anderson

Analytical engineering, the common denominator in the solution of widely different technical problems, is the stock-in-trade of Aéro Associates, a group of consulting engineers and designers with offices in Newark, N. J. Under the direction of Dr. Charles C. Sage, the 40-year organization—with about 30 of its staff graduate engineers—has tackled such diversified problems as the complete redesign of a heavy field artillery rocket, investigation of a design for a jet engine, the design of vibration- and blast-proof structures, and structural analysis of rocket motors.

"We use a sound basic engineering approach with specialized techniques for special problems," says Sage. "Much of our work is in heat transfer, vibration and stress analysis, but we believe we can tackle a technical problem in any field of engineering."

Typical job—One example of how Aéro works. They were called in to solve a complicated vibration and stress problem involving external aerodynamics in a nozzle. The first approach was analytical one—closed that there were too many variables to permit any kind of a solution, but that probably a dynamic model study would provide the answer they are seeking.

The model was designed, built and tested; the problem was solved. In theoretical work, Aéro has extended the limits of heat transfer previously for a thermocouple used to measure gas temperature. In gas thermocouples are shielded to prevent radiation from affecting the temperature they are measuring. Knowledge of the behavior of the shields would let a technician apply a known correction to measured temperatures. Aéro has solved

that problem for the great use of any number of shields.

In other work, Aéro has evaluated problems to determine whether expensive computer time should be bought for the complete answer, or if there is some simpler, approximate solution.

But in spite of the high-tech work, one of the products in engineering, says Sage, is "We give the designer data he can use to apply to his design."

Engineering Shortage—One of Aéro's selling points is the engineering shortage. With a flexible organization, and what they feel is a unique approach, Aéro is in a position to shoulder some of the engineering workload of industry.

The firm has completed contracts for Curtiss-Wright, Lockheed, Douglas, Westinghouse, Allegheny-Baltimore Lab and the Atomic Energy Commission.

The men who form the nucleus of Aéro have a common background in the Special Project Dept. of the M. W. Kellogg Co. where they had worked on the design of liquid and solid rocket motors and components.

When that work was completed, they turned their talents to high-entry level transfer and the other participants of society to a new approach to the engineering shortage.

Real Business—Sage and the men with him felt that by being consultative, they could use their specialized knowledge to best advantage for those who seek and prospective customers. But as Sage put it, "We didn't want to be the ordinary consultant who comes in once a week and looks at the problem. We wanted to take on a job and come up with design data."

The more they studied the problem, the more they felt that fundamental engineering was the best product the

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group could sell. This was the reason behind the fast decision to offer that product.

Auto engineers believe that most of the mistakes offered for the engine shortage are long-term design changes in engine controls. For one example, would have at least two years and more generally face, to be noticed as the capabilities of new graduates.

On-the-job training has proven to be another long-term project. The trouble with it is that when a company has a problem, it exists now, and the answer is needed now, not when the next class of young engineers graduates.

Guided by engineering, in "cook book" formulas isn't the right answer, according to Auto's staff. You generally get two results from that kind of an approach. The lack of time works against an optimum solution, and the company ends up building extra-kind items which certainly are scrapped for something better. This is expensive and time-consuming.

► **The Alternative**—Against these three common suggestions for living with the engineering shortage, Auto believes that the only alternative is analytical engineering. They approach a problem with mathematics, where standard formulas and solutions will usually be worked out.

A look around the office of Auto Associates shows the emphasis on analysis. The staff is predominantly engineering graduates, physicists and mathematicians. Their past experience has included work in aircraft, missiles, there will get engines of all types, piston, rotary, mechanical, gas turbines, etc. They are, controls and instrumentation.

Signs project manager for Kefauver as change of design and development of liquid-propellant boosters and solid-propellant rocket cases.

Director, Auto, Auto technical director, was head of the Kefauver design

division, supervising booster powerplant design for Terrier, Atlas, Sparrow, Honest John, Regal, Minuteman and Scout missiles.

David Thompson, Auto project engineer, previously worked at structural design of buildings and bridges, producing a special set of test structures at Kansas City designed to yield at different percentages in stress. Most previous loading. Thompson now is the company's analytical trouble-shooter who makes the entire field of stress analysis and vibrations.

Ernest Meyer, physicist experienced in X-ray investigations, specializes in lost formulas, gas dynamics and special mechanical stress problems.

► **Work Load**—Auto's current work load is reported about evenly on a non-competitive basis, with payment for time and material.

The firm tries to maintain a permanent organization, and it job shop, according to Sign. The group is open to a project basis, with key men leaving from one job to another.

Sign points out that Auto personnel are comparable to the average college graduates. "But we feel that we can offer more, because we are equipped to design, develop, build and test the special hardware required for the job."

So far the Auto formula has been working. The firm has grown slowly but continuously, and it now has about between six and a dozen projects in the works at any one time. Sign says that the diversification of jobs helps recruiting easier, and adds that Auto can provide interesting jobs directed by experienced men who have more than the rest they are leaving. "This is a good atmosphere for experience," says Sign.

"There's one other important point," says Ben Alcock. "We don't afford to make mistakes. Everything we do shows."



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PRECISION RESISTOR on which metal grid is attached to ends of lead glass tube. Grid is hermetically sealed.

New Capacitor Shows Long Life at 200C

Bolo's HT-2 capacitance units far exceed military specs; new glass-bonded precision resistors have no inductance.

By Philip Klein

A remarkable new capacitor, capable of operation for 30,000 hours at 200C frequencies without any voltage derating, should prove valuable to avionic equipment designers trying to break the "thermal barrier" associated with avionic and high-speed circuits. The capacitor's capabilities compare with present military specs which require only a 250-hour lead-life test at 150C. Developed by Bolo Research Labs., Norwalk, N. J., the new HT-2 capacitor has characteristics which equal or exceed the best features of paper-type capacitors, and possibly more, according to company figures. The new test is now in limited production.

Bolo also has developed a new type of compact hermetically sealed, precision resistor, featuring no inductance,

high resistance resistors, and good stability. The company says this will compare with existing deposited-film and wire-wound resistors in most applications.

► **Right at Wright-Aircraft.** WAA checked the glass-bonded performance figures which Bolo quotes for its new HT-2 capacitor with Wright Air Development Center's Electronic Components Lab., which questioned the test.

"The WADC project engineers and the center's tests of jarred samples had confirmed Bolo's figures. Furthermore, correlation resistance of some special units was so high that until very recently WADC had its equipment with sufficient accuracy to measure it."

► **Performance Data—**Here are some of the figures which Bolo gives for its new HT-2, compared with correspond-

ing values for a high-temperature capacitor made by Company X.

► **Temperature range of test derating:** Bolo, -50C to 200C; Company X, -50C to 150C.

► **Temperature stability:** Bolo, No more than 2% change in capacitance between -70C and 200C; Company X, 17% between -50C and 150C.

► **Insulation resistance:** Bolo, Above 5×10^{12} between -70C and 150C; 5×10^{11} at 200C; Company X, 5×10^{10} per ohm-cm at 150C. (Bolo units with an IR of 5×10^{10} are available on special order.)

► **Power factor:** Bolo, 0.0005 between -70C and 150C, 0.002 at 200C; also the frequency range of 50 to 100,000 cps; Company X, 0.008 between -60C and 150C, 0.015 at 150C, based on measurement at 60 cycles (Power factor normally increases with frequency in conventional capacitors.)

► **Rated Bolo measurements of power factor at 5.5 mc show it to be lower than for most units (0.000545 vs 0.000745), company says.**

► **Lead-life tests:** Bolo reports no difference in performance after 10,000 hours of lead-life tests at 180C and 190C rated voltage. Company X puts its units in tests to only 250 hours of lead-life test (MIL-spec limit at 150C and 800V rated voltage. One failure per 12 units tested is considered acceptable, Company X says.)

► **Long-lead—**One of a batch of 40 Bolo capacitors which have been lead-life tested continuously at 200-210C since September 1952 (approximately 11,800 hours) only one and has failed.



MACHINE for winding HT-2 high-speed capacitors was developed by Bolo.



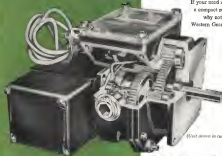
HERMETIC caps are put on neutron test method Bolo-developed machine.

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(Not shown in cutaway)

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NEW YORK 16, NEW YORK

and that occurred during the first 24 hours of test, according to Dr. H. M. Thuermer who heads capacitor development.

Thuermer also showed Avionics Week a batch of capacitors which he said had been under test at 2400 for 30 days without any reported failure to date. ▶ **Compatible Sizes and Values**—The IT-2 is available in standard values of 0.001 to 1.0 mfd., working voltages of 100 to 1,000, with capacitance tolerance of 5% to 10%. Size of Bello's standard units is comparable to 150C capacitors made by other manufacturers, slightly larger in some instances. For example, a Bello 0.01-mfd. unit rated at 400 v. has the same diameter (0.114 in.) as the 150C unit made by Company X, and its length (1 in.) is only 1/8 inch longer.

Despite its advantages, the price of the new IT-2 in production quantities is about the same or only slightly higher than for Company X's 150C capacitors, Bello says. On special order, the new units can be supplied with slightly smaller dimensions, higher or lower capacitance, or with even higher insulation resistance, above 5 x 10¹⁰, the company says.

▶ **Under Wraps**—Bello is considerably stricter about the materials and techniques which give the IT-2 its amazing performance. Dr. Thuermer would only say that the dielectric used is a form of polyether material whose defective content can be tested within certain limits during manufacture. Development work on the IT-2 was started almost three years ago.

Capacitor manufacturing facilities are located behind closed doors at a private room in the Bello plant. The door was opened for approximately two weeks to give Avionics Week a quick and distant look at the capacitor workshop.

▶ **Insulation Resistance**—Unlike other capacitors, the insulation resistance of the IT-2 is expressed in values independent of the unit's capacitance. The reason, Thuermer explains, is that the leakage across the glass and seal determines the effective IR of the capacitor.

If Bello could find a commercially produced end-seal material with less leakage at high temperatures (above 150C), it could boost the overall IR of its capacitors, the firm claims.

▶ **Precision**—Bello's Bello's precision machine, developed under Signal Corps sponsorship, minimizes some of the advantages of curing dehydrated type and wire wound precision machines.

A comparison of existing types shows that the deposited film resistor has much lower inductance and more earth loss than wire-wound units, but its resistance values are much more subject

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Teletest values of aircraft systems is a matter of plus to minus, depending on the nature of the test.

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The flexibility and effectiveness of Bendix-Pacific Telemetering Systems are many, for spending up to 100,000 dollars for ground test equipment, and out of even at the same time.

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- Corporate owners, in particular, appreciate the plan which makes factory-remounted engines available on an exchange basis. This Continental-sponsored service, new several years old, positively eliminates dead time when overhaul is required, and provides a guaranteed power plant, with zero hours, at a fixed low cost. Its availability through 135 master distributors with dealers at practically all airports makes it, truly, another good reason for flying with Continental power.



Continental Motors Corporation
Aircraft Engine Division
Indianapolis, Michigan

temperature. [The next sentence in Armstrong's article reads: "Millions say, however, that critical data indicates that solid state devices between the sea and terrestrial take place over a period of time when the temperature is maintained at suitable constant." This effort, the indicated, counteracts the stated intention with age under high-temperature conditions"—Ed.]

Actually a true power index place. While it is true that the state indicates a accelerated at constant temperature, the solid state devices between the sea and terrestrial is also accelerated, the net result being that the constant remains a stable and reliable condition even under extreme operating conditions.

For example, stress tests conducted in our laboratory under an ambient temperature of 200C show that the resistance of a solid-state device increases as the temperature increases, but that the resistance also increases as the temperature decreases. It is also possible that the increase in resistance can be changed to the maximum level a very long way have been noted by a change in the structure of the material or a change in the diameter of the wire.

Due to the ability under extreme low pressure conditions, as well as the other advantages pointed out in this article, it would appear that this technique is suitable for a wide use.

R. B. SEXTON, Mr.
Wing Wing, The
John Ford Co.
Grand Haven, Mich.

New Microwave Components Reported

A new waveguide quick-disconnect coupling fixture, which can be easily attached or removed on cramped quarters without tools, is one of several recently announced microwave components and devices.

Developed by Arcon, Inc., the new quick disconnect, particularly useful in cramped airborne radar installations, is fabricated of stainless steel, except for mounting studs and bolts. Made available in 25 microwave sizes of 0.500 to 2.0 in. and will maintain protrusion points up to 30 psi at -51C, according to manufacturer, Arcon, Inc., Dept. A, 1331 W. Elizabeth Ave., Elmsford, N.Y.

Other new microwave components include:

- Waveguide switch, Model ASW-100, for 0.75 to 8 GHz operation, has 5-sec. (maximum) switching time, maximum VSWR of 1.05, maximum insertion loss of 1.1 dB, VSWR during switching of 1.1, power handling capability of 0.15 megawatts (CW), or coupling is instantaneous. Actuator is a 110V, 60-cps motor. Thompson Products, Inc., Electronics Division, 2196 Cleveland Road, Cleveland 3, Ohio.
- Guard sections, switch, multi and



QUICK DISCONNECT for waveguide is easy to open (top) or close (bottom). Manufacturer is Arcon, Inc., Arden, N. Y.

lightweight, have a frequency shift of 0.4 sec. between temperatures of -40C to 100C, or 0.15 sec. under ambient pressures of 15 to 45 psi, as coating in General Electric. Company says that 100 voltages will cause for power shift of only 0.1 sec. Used in three models, with maximum frequency of 9,250 mc, 9,278 mc, or 9,110 mc. CIE Tube Dept., Schenectady, N. Y.

• Cross guide coupler, Model XH100, provides higher maximum directivity over the band, less coupling variation with frequency change, and higher breakdown power according to Microwave Development Labs, Inc. Manufacturer says that coupling directivity is approximately 22 db, or more, over coupling level is within 0.4 db of 30 db, and coupling variation is less than 0.6 db over frequency. Manufacturer address: 220 Green St., Wallingford, Conn.

• Waveguide-to-coaxial adapter, Type 15A, for coupling between coaxial transmission lines and waveguide, has a maximum VSWR of less than 1.1 between 6.5 and 10.0 kHz, and less than 1.50 between 7.45 and 8.50 kHz, according to manufacturer. Input end of the coupler is section 8 fitted with an AN UC 31/U over flange. Manufacturer is Polytechnic Research & Development Co., 231 Tillary St., Brookline, N. Y.

• Folded hybrid junction, compact

If You Use **HYDRAULICS** You Need This Folder



Warner's Extensile Power Brake Valve, shown above, has an exclusive hydraulic feed-back feature to give the pilot immediate warning in event of hydraulic system failure. This compact, lightweight, space-saving valve is adaptable in a wide range of system and brake pressures.

Warner is qualified by experience and facilities for the design and production of critical hydraulic equipment for a wide range of uses. Warner engineers will welcome an opportunity to assist you in the development of special hydraulic equipment to meet your particular requirements.

Write for your copy of the illustrated folder shows above describing typical examples of Warner precision hydraulic equipment.



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testing systems equipped to power down, requirements called out in MIL-L-5400

The new Model 1447 three-phase amplifier, developed by Consolidated Measurements Laboratory, Inc., Flaxfield, N. J., can be adapted for any desired phase relationship between the three output phases.

- Output power supplies include:
 - Regulated variable d.c., covering range of 0.600 v. to 0.1,000 ma., output regulation of 0.05%, or better if required. A 0.5-v. screen range is provided for transient work and an amplifier circuit permits small signal modulation of the output. Electronic Measurements Co., Inc., Loses 51 & Maple Ave., Edison, N. J.
 - Low-voltage regulated d.c., Type 1151, continuously adjustable between 0.55 v. can provide current up to 1 amp. Output drift is reportedly less than 5 mv./hour, ripple less than 1 mv. Manufacturer says a 16:1 change in line voltage causes less than 10 mv. change in output, with less than 20 mv. change from no load to full load. Consolidated Engineering Corp., 100 N. Sixth Street, Villa Park, Pasadena 8, Calif.
 - Wide-range regulated d.c., Model RE 2602, adjustable between 290-1,000 v., can supply up to 25 ma., has stability rate of 10⁻⁶ and ripple less than 0.5 mv. Northeast Scientific Co., 1 Grey St., Cambridge 38, Mass.
 - Magnetically regulated, called Stabil-Rite Type A, is available in 6, 12, or 25-v. models, rated up to 100 amp. Regulation is reportedly better than 1% from no load to full load, within 0.5 to 2.5% for input line variation of 95 to 105 v. Regule is quoted at \$5.50 rms. Manufacturer is Magnetics Research Corp., 359 Keweenaw St., St. Joseph, Mo.



For Precise Frequency

Superstition frequency variation of 1 cps and average deviation over 10-minute period of 0.1 cps is claimed for new precision frequency regulator for aviation, which power are for control and navigation systems requiring close frequency control. Model M-1407 weighs 28½ lb., can be used with single or three-phase power and is adapted to a wide variety of different systems, says maker, W. L. Munnis Corp., New York.

TESTER FILTER CENTER 38220

• Silver Transmitters Non-Test Instruments, Inc. D. G. K. Test control quite a bit of the recent Dorian Communications. Author's Electronics with no disclosure that the company can now supply production quantities of high-temperature, green-emission p-n-p-junction transistors, in three different types: Type 900 is rated at 20 milliwatts at 100°C, Type 981 at 40 milliwatts at 150°C. Both have alpha cutoff frequency of 2 mc., company says. Type 961 has rated power output of 1 watt at 25°C when operated peak-to-peak. Alpha cutoff frequency is not given. Company's address: 1080 Lawrence Ave., Dallas, Tex.

• Micro-Minutiae Capacitor-Ground Electric is developing a new electrolytic capacitor for transient currents, reported to be half the carbon match head size of its principal manufacturer, Inc. (Electronic World Apr. 24, p. 63). Production availability of the new line has not been disclosed.

• Reprint for H-Bush Trans-Magnet, a continuous wave phase comparison system for accurately determining aircraft position, was used to pinpoint aircraft participating in the recent H-Bush tests at the Pacific, according to H-Bush Instrument Co., which developed the system. Reprint recently was tied in with a helicopter adapted and used to control its hovering position automatically. Air Force Instrument Center, Eglin AFB, is also using Reprint to measure aircraft position in its precision bombing range. Similar equipment was used earlier to survey USAF's Long Range Missile Test Range.

• Bell Systems Controls Regula-Be made wide control system used with Chance Vought Regula missile, involving it to find undamaged after light tests, was developed by Bell Aircraft, the company avails. The (S) Bell system provides proportional control of carrier "ber-type" control, enabling human operator accurately to establish missile attitude, heading, and position of its controls. Positioning error is under 2%, response time is 0.1 sec.

• New High-Temp Precision Tube-Bendix Avionics' Bendix Avionics is now manufacturing a hand-glass per means version of the SAQ3 beam power amplifier which can operate at both temperatures of 300°C for a maximum of 1,500 hours, company says. New SAQ3A Type 9094 is similar to previous type 9095 except for high-temperature built made of Kovar glass.

—FK
AVIATION WEEK, May 31, 1954

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NEW AVIATION PRODUCTS



NEW SPOT solder works fast.

Solderer Operates Only As Tool Touches Work

A rheogenic, carbon tipped, electric spot solderer has been introduced by Novelec International, Inc.

Known as the Novelec Lenzel, the tool operates on low voltage applied through an air single phase transformer. It's said to apply extreme concentrated heat the instant tool contacts work to be soldered. Heat continues at the high level during entire soldering operation, then shuts off when contact between tool and work is broken.

Solderer comes with a pivoting handle, the end of which is formed to act as a shield against the heat. The transformer can be adjusted to as different levels. The tool can be fitted with two carbon tips or tapes, in addition to the end fittings, and the tape can be fashioned to any shape to facilitate work in difficult and unusual soldering operations, the maker says.

Point of contact is held in position, right angled by a nut. Interchangeable sleeves permit selection of size and shape of tip applicable to the job.

Carlitos, Costa, or three distributors A, B and C.

New Rotary Actuators Are Small, But Powerful

A line of new miniature, high-torque rotary actuators is said by its manufacturer to include the smallest, lightest packages for their specific output capacities. Made by Globe Industries, the units consist basically of the Globe permanent magnet Noto-Mite and planetary gear reduction.

The manufacturer reports special units can be developed for particular applications, including low backlash, wiper/potentiometer, dynamic loading, high clutching, follow-up potentiometers and speed governors.

Minimum dimensions are 2 1/2 in. and weights go up to 2,000 in. as torque depending on output speed. Voltage ranges from 4 to 400 v. The actuators can be arranged for different speeds, tensions, angular relations and include mounting rails of desired design. Industries, Inc., 1764 Strickland Ave., Dayton 4, Ohio.

Aircraft Polisher Gives Hand-Rubbed Effect

Cycle Mfg. Co.'s new polisher and buffer for cleaning and polishing air craft wings and fuselage incorporates oscillating (back and forth) rather than rotary motion.

The manufacturer reports that the oscillatory action of the fast-lead unit gives the same action as hand rubbing, eliminating the high peripheral action that is characteristic of rotary tools. This permits steel tanks or bumpers.

The machine will operate slowly on a flat surface when in operation, the company notes.

A variety of slip on bonnets for sanding, smoothing, buffing, cleaning and polishing are available for use with the unit.

Cycle Mfg. Co., 2140 So. Delaware, Denver, Colo.



AMPLE LEGROOM is added in addition of new Huskies are shown.

New Seat Units Could Save 300 Lb. per DC-6, -7

Handison Fuel & Engineering Co. has developed a new lightweight chair that is said to be completely interchangeable with all Douglas DC-6 and DC-7 airplane equipment.

Currently being introduced on Delta C-68 Airbus DC-7 fleet, the chair has fused molded seat and back cushioning, built-in styrofoam headrest and handle supports, articulated

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DISPOSABLE FUEL FILLING. Fuel for the jet-fueled engine is injected in the fuselage through Teflon® flexible metal hose. Tough, light weight Teflon is rated for temperatures from -20° to +400° F and for pressures to 500 psi—reliably covers fuel in engine nacelles with double vibration and tough use, is resistant for simple configuration.



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ing unit batteries, custom upholstery covers and molded. Rollback side paneling. High moderate clearance in the seat is used to provide good legroom. Double seats are installed in 90 and weigh from 99 to 61 lb each. More factors are utilization of the seat would save up to 100 lb per aircraft in DC-3 and DC-4.

Henderson Tool & Engineering Co., Los Angeles, Calif.



CONNECTOR, various cable coupling.

One Hand Can Operate Quick-Disconnect Unit

One hand is all that is needed to operate a new quick-disconnect unit put on the market by Hydraulic Products Co. The H. P. Quick Disconnect has reduced extension-retraction time for all Standard Aircraft Standard Cessna-type operations.

Designed to eliminate miskey and loosening in aircraft and in cable car trails, the unit has been tested successfully with tension and compression loads of about 2,800 lb. It incorporates a check-like locking unit with sliding ratchet.

The device is supplied from stock for all standard thread sizes, and is said to be readily adaptable for any special design attachments.

Hydraulic Products Co., 80 Federal St., Boston, Mass.

Precise Dividing Head Is Fully Adjustable

For engraving, drilling, light milling, grinding and upset work on dial-cams, templates, round dies, cylindrical parts or anything requiring precise radial settings and rotary divisions, a new fully adjustable dividing head has been developed by H. P. Price Engineering Machine Co.

Designated the Price Patent Dividing Head D44, the device features adjustment from horizontal to vertical position, rotates a full 360 deg. with precision graduation, has fine adjustment in minutes for rotary micro setting and incorporates a three-pin, three-rip clutch.

Overall dimensions are 7 1/2 x 7 1/2 x 4 in. Height of the chuck in horizontal position is 7 1/2 in., vertical clamping capacity is 4 1/2 in. and internal up to 4 1/2 in. Net weight is 15 lb.

H. P. Price Engineering Machine Co., 31 Industrial Row, Hingham, N. J.

ALSO ON THE MARKET

Insulated thermocouple extension wire, type FN, has polyvinylchloride conductors and nylon insulation overall. Precision types used cotton as insulation. Nylon permits smaller diameter, smoother surface, increased resistance, easier shipping and lower cost. It is made for zero resistance, copper conductors and insulated shield wires in 14, 16 and 20 gage. Thermo Electric Co., Inc., 8000 River Township, Rockville Park Post Office, N. J.

Magneta separator for hydraulic fluid system is lightweight and permanent. It screens fine steel particles that may wear off moving parts. Unit was designed specifically for use in aircraft by hydraulic circuits but especially may be installed wherever working pressure does not exceed 5,000 psi. Steel enters from either end and is filtered through a stack of soft steel grids which are strongly magnetized. Separator measures 18 in. in length, 7 1/2 in. in diameter. It is made for 1/2-in. tube connection, and has a maximum capacity of 10 gals.-5 G. Tuxton Co., Inc., Tuxton, N. J.

GIANT PRESSES and tiny tubes . . . off a part of Kaman

The production of Kaman helicopters requires large plant facilities, an extensive inventory of machine tools and equipment, and men. From techniques devoted to the research, design and development of aerodynamics, structural, electrical, and electro-mechanical systems and systems to production customers skilled in the art of metal working. All are part of Kaman, and each helps explain the universal acceptance of Kaman Performance. Brochure on request.

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VICKERS VISCOUNT low-engine turboprop, of which approximately 100 have been ordered by BIA and a number of other airlines

Turboprop Transport Battle Heightens

- **Convair counters reported Capital Airlines deal for Vickers Viscounts with first flight of C-131C.**
- **Company study claims that piston-powered CV-340 can be operated more profitably than British contender.**

By Richard Belmont

International competition for the medium transport aircraft market moved toward a climax last week with these developments:

- Capital Airlines is on the verge of purchasing Vickers-Armstrongs turboprop Viscount 700s to bolster its fleet.
- Convair backed its bid for turboprop transport business with the first flight of the C-131C at Ft. Worth, Tex.
- Convair also disclosed the Viscount's operating costs with the airline performance of the 340.

Capital officials in Washington would not comment or deny reports of an impending deal with the British manufacturer until J. H. Cieszkowski, the airline's president, returned from England.

An industry source just returned from Boston told Aviation Week that Vickers offered Capital four Viscounts on a one-year trial basis. If the airline approved of the Viscount, it could buy and sign a contract for 40 more, it is reported.

Vickers also reportedly has offered to establish a spare parts depot in this

country and Capital would pay only for parts requisitioned from the depot, thus avoiding the expense of maintaining a sizable spare parts inventory.

The Viscount's four turboprop engines normally would be operated at Rolls-Royce of Canada, Ltd., at Montreal, where Rolls builds the Nine engine and operates as overhaul depot.

• **Tough Competition—U. S. manufacturers consider such an offer extremely tough competition.** Some observers believe Capital will find it difficult to turn down such an attractive contract. However, the airline said last week its officials were looking over all British transport aircraft.

Only problem before Capital could fly Viscounts in the U. S. is Civil Aeronautics Administration certification. In England, industry observers report, the CAA certification group, headed by W. H. Woods, chief of CAA's Aircraft



CONVAIR YC-119C has large, square-tipped props. Convair officials (photo, right) get first flight details from test pilot B. A. Endace (left). Looking on: August C. Swenson (right), Convair vice president and general manager of the St. Louis Division where the YC-119 was modified to 144 Y-719-10. Above: turboprop, and Paul Lynch, project engineer. YC-119C first flew Nov. 28.

Licensing Division, appear likely to continue the Vecmont.

Convair's C-113C is powered by two Allison 146 turboprops that develop 3,750 hp each, compared to the 2,500 hp of the Pratt & Whitney Aircraft R2600-CB50 supercharging engines of the CV-340.

►140 Convairmen—Convair announced last summer that 750 conversion kits (Aviation Week Aug. 20, p. 34) would be available for airline operation by the first quarter of 1973. The kits will enable airlines operating 140s to make their own conversions to turboprop power.

Cost of the conversion operation is expected to be \$150,000 per aircraft. Kits will include powerplants, new seats and engine exhaust and control systems. Convair's 140s have been stressed to take turboprop power so that no structural modifications will be required on conversions.

Addition of turboprops to the CV-340 will increase top speed from 275 to 315 mph. Top speed of the C-113C is 180 mph, with a maximum cruising altitude of 18,000 ft.

Airline operators to get FAA commercial certificates for the T35 in the fall of 1973.

The Roll-Rolls Dart B.Da 3 turboprop now in service is rated at 1,900 hp, plus 573 lb static thrust (Aviation Week Dec. 14, 1971, p. 17). These coming into service have been boosted to 1,530 hp.

►Turboprop Experimenters—Gen. Joseph T. McHenry, Convair president, asserts that "Convair probably has more varied turboprop experience than any aircraft manufacturer in the industry, and we are fully aware of the future possibilities of turboprop commercial transport."

"At the moment, however, our own cost studies and figures presented to the

Card Associates Board by such operating airlines as itself and Continental definitely show the piston-powered Convair 140 to be less expensive to operate than the turboprop Vecmont."

More than 900 Convair-Learns now are in use by 13 airlines throughout the world. The Vecmont has been flying commercially since Helsinki, Finland, airlines inaugurated the turboprop transport on its London-Cyprus route Apr. 15, 1973 (Aviation Week May 13, 1973, p. 25). BGA now is operating 10 Vecmonts.

►Comparison—With that experience, here is the new turboprop transport, according to a Convair study.

►Price of the Vecmont, including main equipment, is \$745,000. A Convair 140 costs \$655,000.

►In the first year of operation, each of the Vecmont's Dart turboprops to cover overhead at least 2.85 times. The F4-WA R2600s on the Convair require overhead 1.52 times per year. Convair claims that R2600s last about one quarter as much as maintain as the Vecmont's turboprops.

►On a year-round basis, Convair figures it can carry four more (64 total) revenue passengers 14 mph faster the same distance at 10,700 lb less weight. Moreover, gross weight at takeoff of the Vecmont is 68,000 lb, the Convair is 67,600 lb.

►Under one round condition, the Vecmont can fly a 500-mi. trip with a 12,000-lb payload at an average block speed of 225 mph. Such a trip would cost a Vecmont operator \$535. To break even, the turboprop would have to carry 37 passengers and 75% cargo load factor.

A Convair, under the same conditions, would fly the trip with 11,000-lb payload at 243 mph, which would cost \$450. In order to break even, the Convair would have to carry only 25 pas-

sengers, according to Convair's figures.

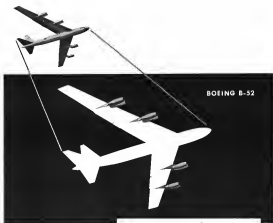
►In hot weather, the Vecmont requires 6,400 lb more fuel to cover the same 1,000-mi. trip than does the 340. Convair figures the speed on a hot day would be 570 mph for the Vecmont, 270 mph for the 140.

►Vecmont's Dart engines have helped fuel that a seven cents cheaper per gallon than the 100 octane fuel needed by the Convair-Learn. J. G. Zevilly, Convair's director of contracts, says but the Vecmont burns almost twice as much as the 140 on either 100 or 800 m.p.g. fuel, he adds.

►Oil costs show about a 50% cost advantage for the Convair, says Zevilly. The overhead of needed by the Vecmont costs \$15 per gallon. The natural oil for the Convair costs 75 cents per gallon, but a synthetic Convair oil 1.75 cents per unit per mile. On the first-class, 40-passenger Viking, the cost is 2.50 cents per seat per mile. Zevilly says. On a 500-mi. trip, the costs are 1.94 cents for the 340 and 2.50 cents for the Vecmont, he points out.

►Approach version of both planes carries 45 passengers. On a 100-mi. tourist trip, the Convair costs 1.58 cents per seat per mile. The Vecmont costs 2.34 cents per seat per mile. For a 600-mi. trip, costs would be 1.41 cents for the 340 and 2.09 cents for the Vecmont, according to Convair.

►The British turboprop now event at 15,000 ft. "That is a particular advantage," Zevilly says, because it is an unstable terrain. In the 300-mi. range, where most trips are made, the optimum altitude for both planes is approximately 11,000 ft., he says. For a 1,000-mi. trip the optimum altitude



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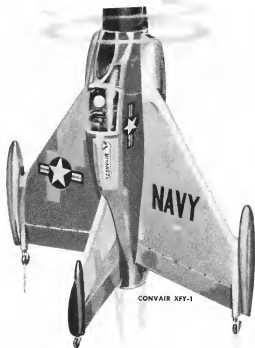
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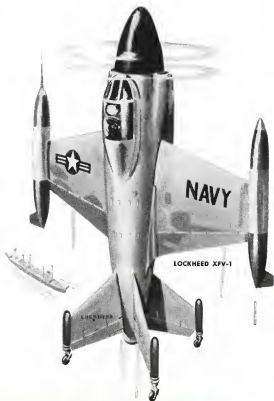
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CONVAIR XFY-1



LOCKHEED XFV-1

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